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TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

09/701611

INTERNATIONAL APPLICATION NO.  
PCT/FR99/02441

INTERNATIONAL FILING DATE  
October 11, 1999

PRIORITY DATE CLAIMED  
April 2, 1999

TITLE OF INVENTION METHOD FOR PRECONDITIONING AND ENCODING A DATA TABLE, AND METHOD  
FOR THE IMPLEMENTATION OF TABLE REQUESTS ON A VECTORAL PROCESSOR  
APPLICANT(S) FOR DO/EO/US

Bernard NIVELET

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).
4. ☒ The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
  - b. ☒ has been communicated by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
  - b. ☐ have been communicated by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 16 below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98. with cited references
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.  
to BULL S.A.
13. ☒ A FIRST preliminary amendment.  
☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☒ A change of power of attorney and/or address letter.
16. ☒ Other items or information:  
Verification of Translation  
Copies of PCT Forms RO/101; PCT/IB/301 & PCT/IB/304, PCT/IB/308 + Demand

0010021" 11910260



FIELD OF THE INVENTION--;

Page 1, at line 14, before the paragraph beginning "Typically,...", insert the following heading at the left hand margin:

--DESCRIPTION OF RELATED ART--;

Page 2, at line 10, and before the paragraph beginning "The object of the ...", insert the following paragraph at the left-hand margin:

--SUMMARY OF THE INVENTION--;

Page 3, at line 24 and before the paragraph beginning "Other advantages and...", insert the following heading at the left hand margin:

--BRIEF DESCRIPTION OF THE DRAWINGS--;

Page 4, at line 1 and before the paragraph beginning "The principle...", insert the following heading at the left hand margin:

--DESCRIPTION OF THE PREFERRED EMBODIMENT(S)--;

Page 4, line 5, delete "peak" and substitute --impulse--;

Page 7, after line 27, insert the following new paragraph:

--While this invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, the preferred embodiments of the invention as set forth herein, are intended to be illustrative, not limiting. Various changes may be made without departing from the true spirit and full scope of the invention as set forth herein and defined in the claims.—

**IN THE CLAIMS:**

Please cancel claims 1 - 12 in their entirety and without prejudice and substitute the following new claims:

1           --13. A method for preconditioning one or more data tables of a decision  
2 application server (4) in a search system (1), intended to be processed by a search  
3 engine (2) responding to queries sent by the decision application server (4), for  
4 selecting records based on given criteria, characterized in that it consists of:

5           - analyzing (14) predicates contained in fields of records intended to fill the  
6 relational database (6) in accordance with given authorized relations;

7           - creating (16) a nomenclature (17) of the predicates from said analysis;

8           - taking the nature of the predicates and the relations to be implemented in  
9 the predicates into account in the queries; .

10           - numerically encoding (15) the predicates in accordance with the  
11 nomenclature (17); and

12           - presenting the encoded predicates in the form of a data table (10) of  
13 numeric values.

1           14. The method according to claim 13, characterized in that the step of  
2 encoding consists of replacing the values of the predicates with indexes of the  
3 predicates in the nomenclature of possible values.

1           15. The method according to claim 13, characterized in that the step of  
2 encoding compacts data.

1           16. The method according to claim 13, characterized in that the step of  
2 encoding takes into account the type of query served.

1           17. The method according to claim 14, characterized in that the step of  
2 encoding takes into account the type of query served.

1           18.    The method according to claim 15, characterized in that the step of  
2 encoding takes into account the type of query served.

1           19.    A method for searching for records in a data table in response to a  
2 given query, according to claim 13, further characterized in that it consists of  
3 installing a copy (10) of a table of the numeric values obtained in a machine with  
4 vectorial capability (9) which processes the numeric values of the table in  
5 accordance with the query served by the decision application server (4).

1           20.    A method for searching for records in a data table in response to a  
2 given query, according to claim 14, further characterized in that it consists of  
3 installing a copy (10) of a table of the numeric values obtained in a machine with  
4 vectorial capability (9) which processes the numeric values of the table in  
5 accordance with the query served by the decision application server (4).

1           21.    A method for searching for records in a data table in response to a  
2 given query, according to claim 15, further characterized in that it consists of  
3 installing a copy (10) of a table of the numeric values obtained in a machine with  
4 vectorial capability (9) which processes the numeric values of the table in  
5 accordance with the query served by the decision application server (4).

1           22.    A method for searching for records in a data table in response to a  
2 given query, according to claim 16, further characterized in that it consists of  
3 installing a copy (10) of a table of the numeric values obtained in a machine with  
4 vectorial capability (9) which processes the numeric values of the table in  
5 accordance with the query served by the decision application server (4).

1           23.    A method according to claim 19, characterized in that the query is  
2 expressed by one or more vectors representing values searched for in a field, and in  
3 that the processing of the numeric values consists of comparing the vector or  
4 vectors to all lines of the table, column by column, and saving the line number for  
5 each coincidence.

1           24.    A method according to claim 23, wherein all line numbers selected are  
2 utilized and the relational database (6) comprises an additional field containing the  
3 number of lines, and further characterized by extracting from the relational database  
4 (6), in response to a query, the plaintext records searched whose numbers  
5 correspond.

1           25.    A method according to claim 23, characterized in that it consists of  
2 expressing processing results in statistical form, a synthesis of which is provided in  
3 response to a query.

1           26.    A method according to claim 24, characterized in that it consists of  
2 expressing processing results in statistical form, a synthesis of which is provided in  
3 response to a query.

1           27.    A method according to claim 16, characterized in that the machine with  
2 vectorial capabilities (9) is a supercomputer.

1           28.    A method according to claim 23, characterized in that the machine with  
2 vectorial capabilities (9) is a supercomputer.

1           29.    A method according to claim 24, characterized in that the machine with  
2 vectorial capabilities (9) is a supercomputer.

1           30.    A method according to claim 25, characterized in that the machine with  
2 vectorial capabilities (9) is a supercomputer.

1           31.    A search system (1) implemented by a decision application server (4)  
2 comprising a relational database (6) containing a set of target records, a search  
3 engine (2) coupled with the decision application server (4), activated by a query for  
4 selecting records based on given criteria sent by the decision application server (4),  
5 said engine (2) including a module (8) for preconditioning data of the base (6) and  
6 installing an encoded table (10) corresponding to the base (6) in a machine with  
7 vectorial capabilities (9), said module (8) further comprising:

- 8           - means (13) for reading a data file corresponding to the base;
- 9           - means (16) for building a nomenclature (17) for the values of the fields
- 10 contained in the file;
- 11           - means (15) for encoding fields in accordance with the nomenclature (17),
- 12 taking the nature of the fields and the relations to be implemented in the predicates
- 13 into account in the query;
- 14           - means (21) for analyzing queries sent by the decision application server (1),
- 15 taking into account the authorized relations, the constraints on the predicates and
- 16 the nomenclature (17); and
- 17           - means (22) for encoding the filtered query into a set of vectors containing
- 18 the values to be found in the fields in accordance with the associated relations, in
- 19 the form of an input file usable by the machine with vectorial capabilities (9).

1           32.    A system according to claim 31, further comprising means (23) for  
2 extracting in plaintext the data searched for in the result file obtained as output from  
3 the machine with vectorial capabilities (9), using search means installed in the  
4 decision application server (4).

1           33.    A system according to claim 31, further comprising a management  
2 agent (24) that monitors the activity of the machine with vectorial capabilities,  
3 handles abnormalities, and activates search means in the machine with vectorial  
4 capabilities (9).

1           34.    A system according to claim 32, further comprising a management  
2 agent (24) that monitors the activity of the machine with vectorial capabilities,  
3 handles abnormalities, and activates search means in the machine with vectorial  
4 capabilities (9).--

T2147-906626-US 3822/JPL(PCT)

IN THE ABSTRACT:

Please cancel the Abstract at page 11 in its entirety and substitute the following new Abstract:

09701611 120100



**--ABSTRACT**

The invention relates to data warehousing systems (1) wherein a search engine (2) implemented by a decision application server (4) acts on a relational database (6) that contains a set of target records. The engine (2) is activated by queries for selecting records based on given criteria and comprises a module (8) for preconditioning the database (6) supplying a preconditioned encoded table (10), periodically updated at the same time as the relational database (6) itself, to a machine with vectorial capabilities (9) in order for it to be processed. It also comprises an agent (7) for extracting target records, activated by the queries based on the result of the processing of the table (10) installed in the machine with vectorial capabilities (9), from the relational database (6).--

**REMARKS**

This Preliminary Amendment is filed to insert headings to conform the application to U.S. practice, to eliminate the use of multiple dependent claims, and to correct informalities in the specification, claims and abstract resulting from a literal translation of the French text.

Early action on the merits is earnestly solicited.

Respectfully submitted,

MILES & STOCKBRIDGE P.C.

Date: December 1, 2000

By: 

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T2147-906626 -US3822/JPL(PCT)

**IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (D.O./E.O./US)**

Applicant: Bernard NIVELET

International  
Application No.: PCT/FR99/02441

International  
Filing Date: 11 October 1999

U.S. Serial No.: To be Assigned

U.S. Filing Date: December 1, 2000

For: **METHOD FOR PRECONDITIONING AND ENCODING A  
DATA TABLE, AND METHOD FOR THE IMPLEMENTATION  
OF TABLE REQUESTS ON A VECTORAL PROCESSOR**

**PROPOSED DRAWING CORRECTIONS**

Hon. Commissioner of Patents and Trademarks  
Washington, D.C. 20231

Sir:

Applicant requests approval of the drawing corrections on Figs. 1 – 3 as  
shown in red on the attached sheet.s

The proposed corrections only comprise translating the French terms into  
English and removing the headings "1/3" – "3/3" to conform the drawings to U.S.  
practice.

Respectfully submitted,

MILES & STOCKBRIDGE P.C.

Date: December 1, 2000

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09/701611-120100

1/3

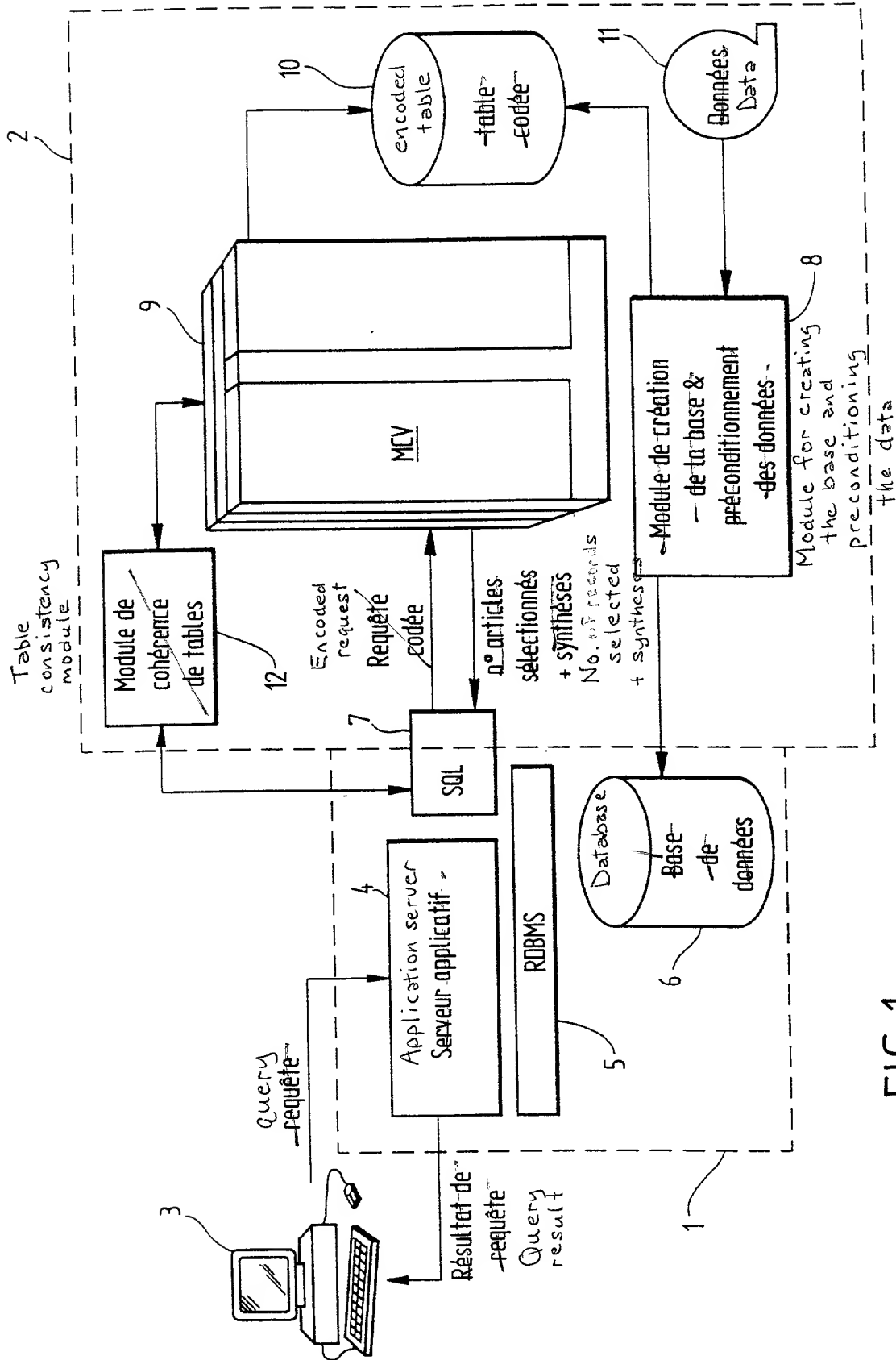
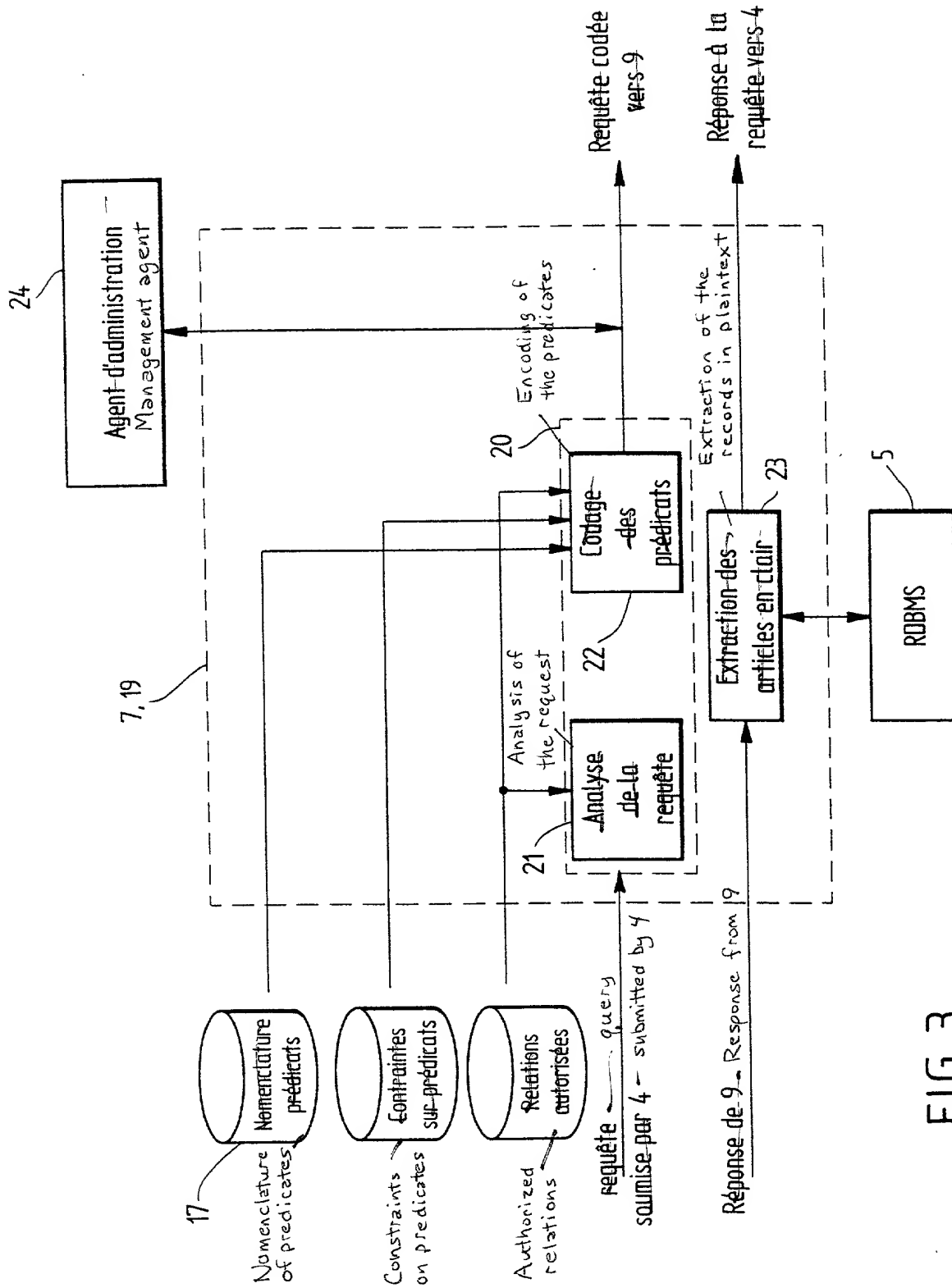


FIG. 1





3/3  
Encoded to 9

Response to the  
to 4

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3/PRTS

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**METHOD FOR PRECONDITIONING AND ENCODING A DATA TABLE, AND  
METHOD FOR THE IMPLEMENTATION OF TABLE REQUESTS ON A  
VECTORAL PROCESSOR**

5           The present invention relates to a method for preconditioning a data table designed to be used by a search engine responding to queries for selecting records based on given criteria.

          It also relates to a method for searching for records, in response to a given query, in a data table, and a search engine acting on a data table containing a set of target records, activated by queries for selecting records based on given criteria.

10           The field of application is what is known as "data warehousing." More specifically, it relates to large historical databases, relatively stable over time, from which one wishes to extract populations defined by criteria with very frequent access and the shortest possible response times.

          Typically, these bases can contain several million records, each of which can include  
15   hundreds of fields, and standard query response times are on the order of one second.

          The potential clients for this type of base are essentially large-scale retail operations, banks and insurance companies.

          Large-scale retail operations manipulate historical bases of accounts and purchase  
cards to search for target populations for direct marketing.

20           Banks and insurance companies also manipulate such historical bases related to customer orders, in order to search for populations, potential customers for new products, etc.

          There are known solutions based on the use of parallelism to read records in storage units.

          All of the known solutions use a mechanism for managing relational databases that  
25   are updated and consulted from a network environment. This mechanism is known by the abbreviation RDBMS (Relational Database Management System).

          In a first type of solution, a wholly proprietary SQL (Standard Query Language) search engine is built on a highly parallel architecture based on multiprocessor nodes that control disks on which the database is distributed. The queries are divided up among the  
30   various nodes, then among the processors.

          The main drawback of this solution is its cost/performance ratio, which is quite high. Thus, in order to achieve high performance, the configurations must be complex, hence very expensive.

A second type of solution uses standard relational database software in standard machines, generally multiprocessor machines.

In this second type of solution, a standard SQL search engine implements the high parallelism, in accordance with the same principles as the solutions of the first type but with architectural variants in the mechanisms for dividing up the queries and in the management of the cache memories.

The drawbacks of this second type of solution are the same as those of the first type, aggravated by a loss of performance due to the complexity of the software, which is a consequence of its generality.

The object of the invention is specifically to eliminate these drawbacks by providing a search engine powerful enough to execute queries for selecting records based on criteria, in a very short time, on the order of a few seconds, in databases that are large but stable over time (updated periodically, every night at most).

To this end, the first subject of the invention is a method for preconditioning one or more data tables of a decision application server intended to be processed by a search engine responding to queries for selecting records based on given criteria, sent by the decision application server.

The method according to the invention consists of:

- analyzing the predicates contained in the fields of the records intended to fill the relational database in accordance with given authorized relations;
- creating a nomenclature for the predicates from this analysis;
- numerically encoding the predicates in accordance with the nomenclature, taking the nature of the predicates and the relations to be implemented in the predicates into account in the queries.

Finally, it consists of presenting the encoded predicates in the form of a table of numeric values.

The second subject of the invention is a method for searching for records in a data table in response to a given query, consisting of installing a copy of the table of numeric values obtained via the preceding method in a machine with vectorial capability performing the processing of the numeric values of the table in accordance with the query served by the decision application server.

Finally, its third subject is a search system implemented by a decision application server comprising a relational database containing a set of target records, and a search engine



coupled with the decision application server, activated by a query for selecting records based on given criteria sent by the decision application server.

According to the invention, the system is characterized in that the engine includes means for preconditioning the data from the base and installing an encoded table

5 corresponding to the base in a machine with vectorial capabilities, these means comprising:

- means for reading a data file corresponding to the base;
- means for building a nomenclature for the values of the fields contained in the

preceding file;

10 the fields and the relations to be implemented in the predicates into account in the query;

- means for analyzing queries sent by the decision application server, taking into account the authorized relations, the constraints on the predicates and the nomenclature; and

15 - means for encoding the filtered query into a set of vectors containing the values to be found in the fields in accordance with the associated relations, in the form of an input file usable by the machine with vectorial capacities.

The system also includes means for extracting in plaintext the data sought in the result file obtained as output from the machine with vectorial capacities, using search means installed in the decision application server.

Statistical syntheses can also be performed on the results of the search.

20 The invention has the particular advantage of providing very short response times that are impossible using RDBMS techniques, and a high query throughput.

It has the further advantages of being transparent for the existing application and of having no impact at the applicative level.

25 Other advantages and characteristics of the present invention will emerge through the reading of the following description, given in reference to the attached figures, which represent:

- Fig. 1, a schematic diagram of a search system using a search engine according to the invention;

30 - Fig. 2, a schematic diagram of a module for preconditioning and installing the database, according to the invention; and

- Fig. 3, a schematic diagram of a SELECT agent according to the invention.

In these figures, the homologous elements are designated by the same numerical references.

The principle of the invention is described below, and its illustration is based on the use of a vectorial machine known as a supercomputer.

Such a machine is characterized by processors having several arithmetic units, or "pipelines," and by enough memory bandwidth to supply power to all the processors at each  
5 clock peak.

However, the invention is not limited to this type of machine and applies to any machine with vectorial capabilities, i.e. machines whose performance is comparable to that of vectorial supercomputers.

In fact, the current scalar computers include several arithmetic operators, and memory  
10 bandwidths are increasing as a result of the use of what is known as "crossbar" technology. It is therefore foreseeable that in the near future, the performance of scalar computers will be comparable to that of vectorial supercomputers.

Vectorial supercomputers currently offer a response to the ever-increasing demand for performance in the fields of science and of industry in general.

Today, vectorial machines are the only ones that can meet the constraints already  
15 expressed in the preamble of the present description.

The basic idea of the invention is to take advantage of the exceptional power of machines with vectorial capabilities in order to perform comparisons on numeric vectors, encoded images of the fields of the data table.

The transformation into numbers of the data in the table to be processed and the  
20 formation of a nomenclature from these numbers are performed during the installation of the relational database.

The encoding of the data into numbers has the other advantageous effect of compacting the data of the base. Thus, as opposed to solutions of the RDBMS type, which  
25 manipulate the plaintext content of each field, the method according to the invention acts only on a number representing this field.

The table thus compacted can generally be contained in memory (no disk input/output) or can be loaded into memory in columns, which represents only reduced input/output volumes.

Finally, the invention offers the capability to adapt the encoding to the types of  
30 queries that are served. It also makes it possible to implement an effective optimization of the processing.

Fig. 1 illustrates a schematic diagram of a search system using a search engine according to the invention.

The search system comprises, on the left side of the figure, a decision application server 1, representing the general case, delimited by an enclosing broken line, and the search engine 2, on the right side of the figure, delimited by an enclosing broken line.

The decision application system 1 is coupled with a user (or client) station 3.

The decision application system 1 comprises an application server 4 that generates predefined queries, an RDBMS 5 that manages a database 6, and an SQL agent 7 in charge of analyzing the queries submitted by the application server 4, and possibly extracting the target records from the base 6, relying on the RDBMS 5.

The user (the client) sends, via the application server 4, queries corresponding to characteristics of target records that meet given criteria, and receives from the same server 4 the result of the queries in the form of either a list of records that meet the criteria or statistical syntheses, or both.

The engine 2 implements a module 8 for preconditioning the data table and uses the resources of a supercomputer 9 to process a copy 10 of the preconditioned table in order to extract the target records. The module 8 for preconditioning the data table receives the data, for example imported from a data bank 11. This data is organized in the form of a table and numerically encoded in a format that is directly usable by the supercomputer 9 and executable in an optimal way by the queries.

A copy of this table is accessible by the supercomputer 9. It resides, for example, in the memory space of the supercomputer 9 and can be partitioned if its size exceeds that of the available memory.

The supercomputer 9 received from the SQL agent 7 the translation of the queries submitted by the application server 4 in the form of an input file.

The supercomputer 9 then processes this input file using a given search program that takes maximum advantage of the power of the pipelines of the supercomputer 9 while working on the columns of the copy 10 of the table.

At the end of the processing, it delivers as output, in the form of a file, the results of the processing performed, which corresponds to a list of the line numbers of the records selected by the search, and possibly to statistical syntheses requested on the records found.

If plaintext records are requested, the SQL agent 7 operates on the result file to extract the selected records in plaintext from the relational database 6.

The SQL agent 7 then transmits the results (selected records and/or statistical syntheses) in the form of an SQL response to the application server 4 that sent the query.

A table consistency module 12, accessible to the SQL agent 7, contains a list of the identifiers of the tables present and the nomenclature of the predicates for each of them.

Fig. 2 illustrates a schematic diagram of the module 8 for preconditioning and installing the table, according to the invention, delimited by an enclosing broken line.

It comprises first means 13 for reading data imported on any medium, record by record, as input into the module, for example originating from a data bank 11.

The read records are then completed with their number and transmitted to the relational database management system 5, which creates the plaintext data base 6 in the decision application server 1.

It also comprises second means 14 that analyze the predicates in the records in accordance with authorized relations and constraints on the predicates.

Two examples of constraints on the predicates are given below:

In a first example, a column of the database includes only numeric values. In this example, it is not necessary to numerically encode what is already numeric.

In a second example, a column of the data base contains only words, whose alphabetical order will be used in the searches. In this example, the analysis of the predicate will take this relation into account in the numerical encoding of the predicate (in order to preserve the order).

Third means 15 encode the values of the predicates issued by the second means 14. This encoding consists of replacing the values of the fields by their indexes in the nomenclature of possible values.

Fourth means 16 create a nomenclature for the predicates issued by the second means 14 in accordance with the encoding by the third means 15.

The preconditioning module 8 also provides the identifier of the encoded base.

The encoded table, the nomenclature of the predicates and the identifier of the base are presented in the form of files, respectively referenced 10, 17, and 18 in the figure.

Fig. 3 illustrates a schematic diagram of a SELECT agent 19 according to the invention. It substitutes for the SQL agent 7 of the decision application server 1 that hosts it.

It comprises means 20 for transforming queries, delimited by an enclosing dotted line, which queries are submitted by the application server 4 in accordance with the nomenclature of the predicates 17, the constraints on the predicates and the authorized relations.

09/701611

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**Verification of Translation**

I, Robin Holding, having an office at 948 15th Street, #4, Santa Monica, CA 90403-3134, hereby state that I am well acquainted with both the English and French languages and that to the best of my knowledge and ability, the appended document is a true and faithful translation of

**International Patent Application No. PCT/FR99/02441, filed on October 11, 1999 in the name of BULL S.A., invented by Bernard NIVELET.**

I further declare that the above statement is true; and further, that this statement is made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent resulting therefrom.

November 21, 2000

Date

Robin Holding  
Robin Holding

09/701611-20100

The transformation means 20 comprise means 21 for analyzing the SELECT query and means 22 for encoding the predicates.

The query analyzing means 21 translate the query into a set of vectors representing fields to be found and relations implemented, taking into account the authorized relations.

5 The vectors are then encoded by the means for encoding the predicates in accordance with the nomenclature of the predicates, the constraints on the predicates and the authorized relations.

There are as many vectors as there are possible values in the fields of the table.

10 The analysis also makes it possible to build, for each of these vectors, a vector defining what type of comparison to perform for each of the field vectors.

The vectors are organized in the form of an input file usable by the supercomputer 9.

A search program integrated into the supercomputer executes the comparisons between the vectors and all the lines of the table.

These comparisons are performed column by column.

15 In case of the coincidence of a line, its number is saved and the response provided by the supercomputer to the SQL agent 7 is presented in the form of a result file comprising the list of the numbers corresponding to the lines selected. The requested statistical syntheses are calculated from this file.

20 An extraction module 23 then constructs, if requested, the plaintext response addressed to the application server 4 that sent the query, by extracting from the relational database 6 the records corresponding to the list of the line numbers of the result file from the supercomputer 9, using the record number added to the base 6.

The SELECT agent 19 also supplies the identifier of the table. The table consistency module 12 controls the identity of the table to be processed in case of a plurality of tables.

25 A management agent 24 is also coupled with the SELECT agent 19 and makes it possible to monitor the activity of the supercomputer 9 and handle abnormalities. It also activates the loading of the search program into the supercomputer 9.

## CLAIMS

1           1.       Method for preconditioning one or more data tables of a decision application  
2 server (1), intended to be processed by a search engine (2) responding to queries for selecting  
3 records based on given criteria, sent by the decision application server (1), characterized in  
4 that it consists of:

5               - analyze (14) the predicates contained in the fields of the records intended to fill the  
6 relational database (6) in accordance with given authorized relations;

7               - create (16) a nomenclature (17) of the predicates from this analysis;

8               - numerically encoding (15) the predicates in accordance with the nomenclature (17),  
9 taking the nature of the predicates and the relations to be implemented in the predicates into  
10 account in the queries;

11 and in that it consists of presenting the encoded predicates, in the form of a table (10) of  
12 numeric values.

1           2.       Method according to claim 1, characterized in that the encoding consists of  
2 replacing the values of the predicates with their indexes in the nomenclature of possible  
3 values.

1           3.       Method according to claim 1, characterized in that the encoding compacts the  
2 data.

1           4.       Method according to any of claims 1 through 3, characterized in that the  
2 encoding takes into account the type of query served.

1           5.       Method for searching for records in a data table in response to a given query,  
2 characterized in that it consists of installing a copy (10) of the table of numeric values  
3 obtained via the method according to any of claims 1 through 4, in a machine with vectorial  
4 capability (9) performing the processing of the numeric values of the table in accordance with  
5 the query served by the decision application server (1).

1           6.       Method according to claim 5, characterized in that the query is expressed by  
2 one or more vectors representing values searched for in a field, and in that the processing

3 consists of comparing the vector or vectors to all the lines of the table, column by column,  
4 saving the line number for each coincidence.

1 7. Method according to claim 6, characterized in that it consists, using all of the  
2 line numbers selected and the relational database (6) comprising an additional field  
3 containing the number of lines, of extracting from the relational database (6) the plaintext  
4 records searched for whose numbers correspond, in response to a query.

1 8. Method according to claim 6 or 7, characterized in that it consists of  
2 expressing the results of the processing in statistical form, a synthesis of which is provided in  
3 response to a query.

1 9. Method according to any of claims 5 through 8, characterized in that the  
2 machine with vectorial capabilities (9) is a supercomputer.

1 10. Search system implemented by a decision application server (1) comprising a  
2 relational database (6) containing a set of target records, and a search engine (2) coupled with  
3 the decision application server (1), activated by a query for selecting records based on given  
4 criteria sent by the decision application server (1), characterized in that the engine (2)  
5 includes means (8) for preconditioning data of the base (6) and installing an encoded table  
6 (10) corresponding to the base (6) in a machine with vectorial capabilities (9), these means  
7 (8) comprising:

8 - means (13) for reading a data file corresponding to the base;

9 - means (16) for building a nomenclature (17) for the values of the fields contained in  
10 the file;

11 - means (15) for encoding fields in accordance with the nomenclature (17), taking the  
12 nature of the fields and the relations to be implemented in the predicates into account in the  
13 query;

14 - means (21) for analyzing queries sent by the decision application server (1), taking  
15 into account the authorized relations, the constraints on the predicates and the nomenclature  
16 (17); and



17 - means (22) for encoding the filtered query into a set of vectors containing the values  
18 to be found in the fields in accordance with the associated relations, in the form of an input  
19 file usable by the machine with vectorial capabilities (9).

1 11. System according to claim 10, characterized in that it also includes means (23)  
2 for extracting in plaintext the data searched for in the result file obtained as output from the  
3 machine with vectorial capabilities (9), using search means installed in the decision  
4 application server (1).

1 12. System according to either of claims 10 and 11, characterized in that it also  
2 includes a management agent (24) that monitors the activity of the machine with vectorial  
3 capabilities, handles abnormalities, and activates the search means in the machine with  
4 vectorial capabilities (9).

## ABSTRACT

The invention relates to a search engine (2) implemented by a decision application server (1) acting on a relational database (6) that contains a set of target records. The engine (2) is activated by queries for selecting records based on given criteria and comprises means (8) for preconditioning the database (6) supplying a preconditioned encoded table (10), periodically updated at the same time as the relational database (6) itself, to a machine with vectorial capabilities (9) in order for it to be processed. It also comprises means (7) for extracting target records, activated by the queries based on the result of the processing of the table (10) installed in the machine with vectorial capabilities (9), from the relational database (6).

It particularly applies to data warehousing systems.

**FIG. 1**

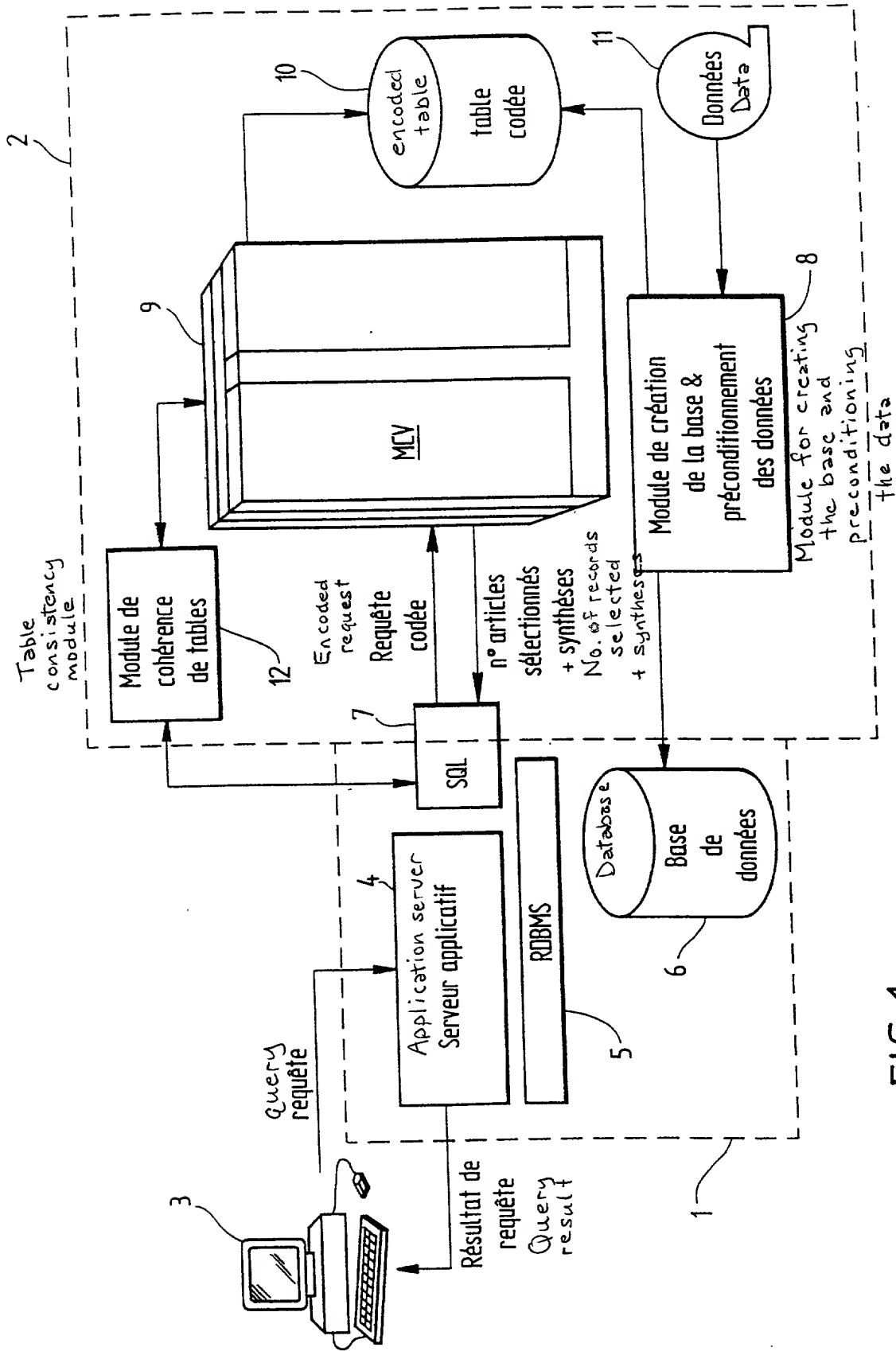


FIG. 1

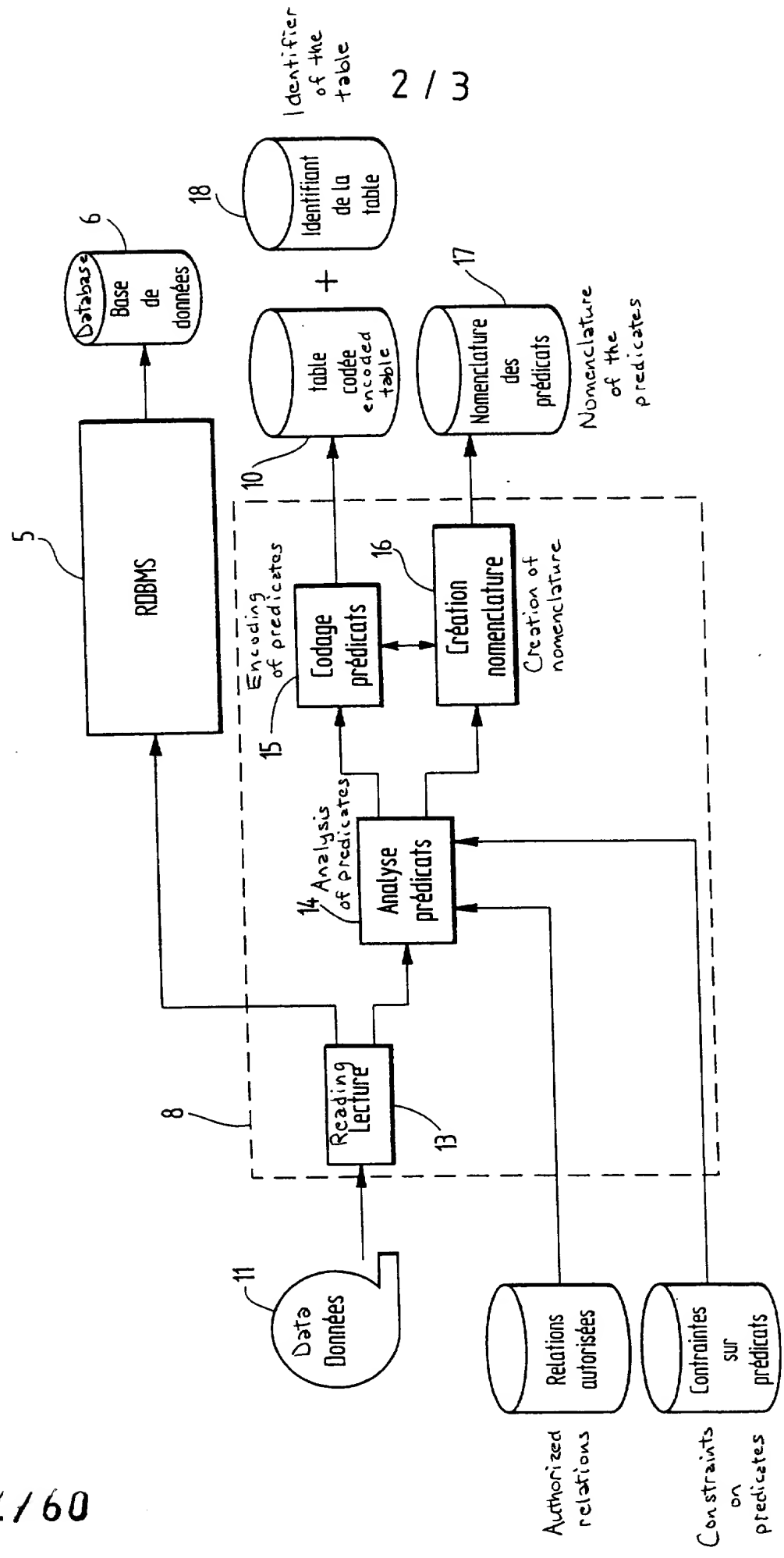


FIG.2

3 / 3

Encoded query  
to 9

Response to the  
query to 4

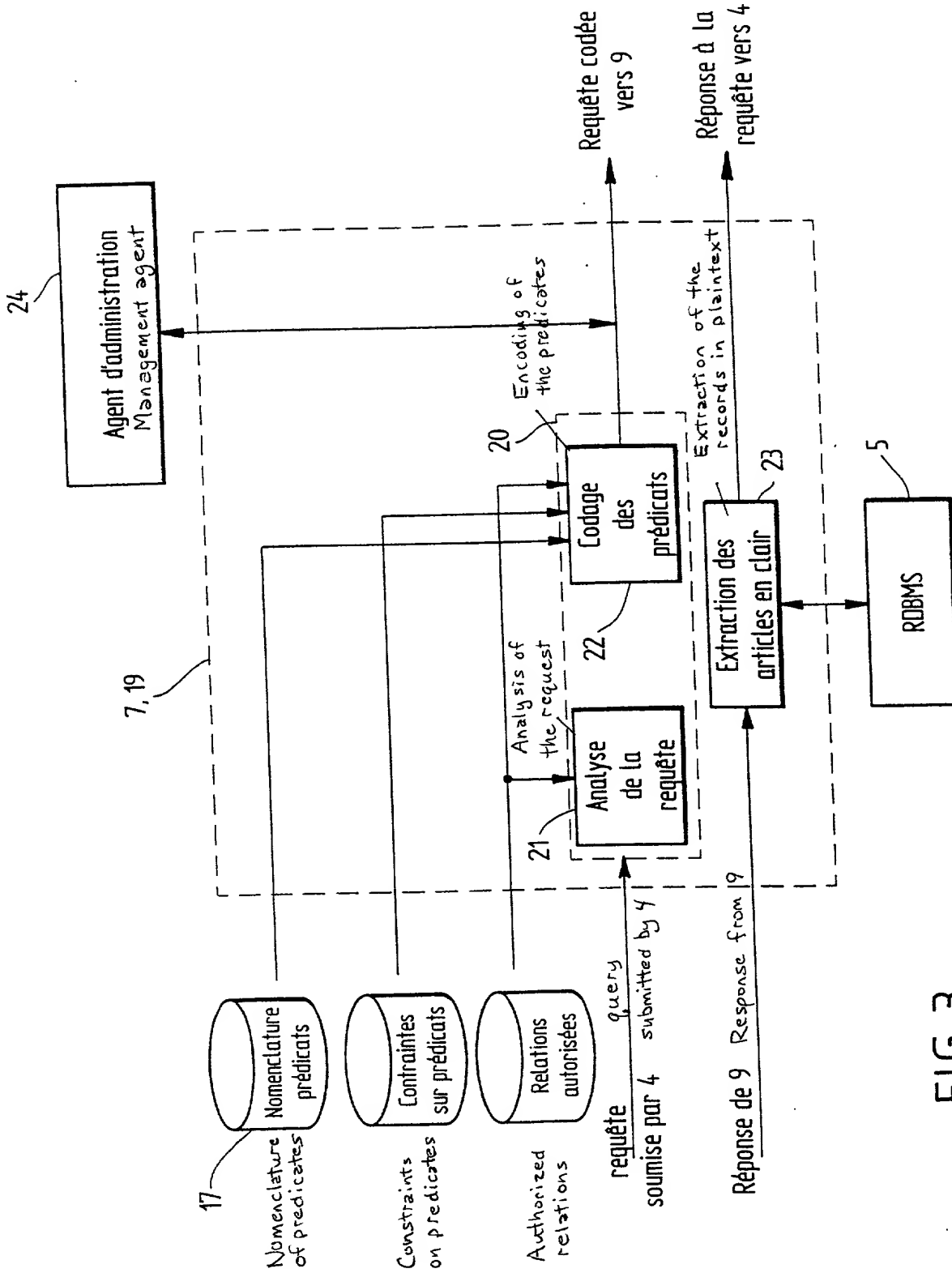


FIG. 3

# Declaration and Power of Attorney For Patent Application

## Declaration Pour Demandes de Brevets Avec Pouvoirs

### French Language Declaration

En tant qu' inventeur nommé ci-après, Je déclare par le présent acte que:

Mon nom, mon domicile, mon adresse postale, ma nationalité sont ceux qui figurent ci-après,

Je déclare que je crois être l'inventeur original, premier et unique (si un seul nom figure sur le présent acte) ou un des co-inventeurs, originaux et premiers (si plusieurs noms figurent sur le présent acte) du sujet revendiqué et pour lequel un brevet est demandé sur la base de l'invention intitulée:

Procédé de préconditionnement et de codage d'une

table de données, et procédé de mise en œuvre de

requêtes tabulaires sur une machine à capacités vectorielles

dont la description  
(cocher la case correspondante)

☒ est annexée au présent acte.

☐ a été déposée \_\_\_\_\_

Numéro de série de la demande \_\_\_\_\_

et modifiée le \_\_\_\_\_  
(si approprié)

Je déclare par le présent acte avoir examiné et compris le contenu de la description identifiée ci-dessus, revendications y compris, et le cas échéant telle que modifiée par l'amendement cité plus haut.

Je reconnais le devoir de divulguer l'information qui est en rapport avec l'examen de cette demande selon Titre 37 du Code des Règlements Fédéraux §1.56(a).

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

the specification of which  
(check one)

☐ is attached hereto.

☐ was filed on \_\_\_\_\_ as

Application Serial No. \_\_\_\_\_

and was amended on \_\_\_\_\_  
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

## French Language Declaration

Je revendique par le présent acte le bénéfice de priorité étrangère selon Titre 35, du Code des Etats-Unis, §119 de toute demande de brevet ou d'attestation d'inventeur énumérée ci-après, et j'ai identifié également ci-après toute demande étrangère de brevet ou d'attestation d'inventeur ayant une date de dépôt antérieure à celle de la demande pour laquelle la priorité est revendiquée.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior foreign applications

Demande(s) de brevet antérieure(s) dans un autre pays:

Priority claimed

Droit de priorité  
revendiqué

99 04130      FRANCE      02 04 99  
(Number)      (Country)      (Day/Month/Year Filed)  
(Numéro)      (Pays)      (Jour/Mois/Année de dépôt)

☒  
Yes  
Oui

☐  
No  
Non

\_\_\_\_\_  
(Number)      (Country)      (Day/Month/Year Filed)  
(Numéro)      (Pays)      (Jour/Mois/Année de dépôt)

☐  
Yes  
Oui

☐  
No  
Non

\_\_\_\_\_  
(Number)      (Country)      (Day/Month/Year Filed)  
(Numéro)      (Pays)      (Jour/Mois/Année de dépôt)

☐  
Yes  
Oui

☐  
No  
Non

Je revendique par le présent acte, le bénéfice selon Titre 35 du Code des Etats-Unis, §120 de toute(s) demande(s) américaines énumérée(s) ci-après et, dans la mesure où le sujet de chacune des revendications de cette demande n'est pas divulgué dans la demande américaine antérieure, de la façon définie par le premier paragraphe de Titre 35 du Code des Etats-Unis, §112, je reconnais le devoir de divulguer l'information pertinente selon Titre 37 du Code des Règlements Fédéraux, §1.56(a), toute information qui se présente entre la date de dépôt de la demande antérieure et la date de dépôt de la demande, soit nationale, soit internationale PCT.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

\_\_\_\_\_  
(Application Serial No.)  
(No. de Demande)

\_\_\_\_\_  
(Filing Date)  
(Date de Dépôt)

\_\_\_\_\_  
(Etat)  
(brevetée, pendante,  
abandonnée)

\_\_\_\_\_  
(Status)  
(patented, pending,  
abandoned)

\_\_\_\_\_  
(Application Serial No.)  
(No. de Demande)

\_\_\_\_\_  
(Filing Date)  
(Date de Dépôt)

\_\_\_\_\_  
(Etat)  
(brevetée, pendante,  
abandonnée)

\_\_\_\_\_  
(Status)  
(patented, pending,  
abandoned)

Je déclare par le présent acte que toutes mes déclarations, à ma connaissance, sont vraies et que toutes les déclarations faites à partir de renseignements ou de suppositions, sont tenues pour être vraies; de plus, toutes ces déclarations ont été faites en sachant que de fausses déclarations volontaires ou autres actes de même nature sont sanctionnées par une amende ou un emprisonnement, ou les deux, selon la Section 1001, du Titre 18 de Code des Etats-Unis et que de telles déclarations délibérément fausses peuvent compromettre la validité de la demande ou du brevet délivré.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

## French Language Declaration

POUVOIR: En tant qu'inventeur, je désigne l'(les) avocat(s) et/ou l'(les) agent(s) suivant(s) pour poursuivre la procédure de cette demande et traiter toute affaire la concernant supris du Bureau des Brevets et de Marques:

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Edward J. Kondracki, Reg. 20,604  
Dennis P. Clarke, Reg. 22,549  
William L. Feeney, Reg. 29,918  
John C. Kerins, Reg. 32,421

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

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5

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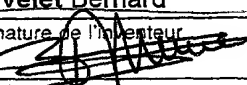
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<b>France</b>			
Nom complet du second co-inventeur, le cas échéant		Full name of second joint inventor, if any	
Signature de l'inventeur	Date	Second Inventor's signature	Date
Domicile		Residence	
Nationalité		Citizenship	
Adresse Postale		Post Office Address	

(Fournir les mêmes renseignements et la signature de tout co-inventeur supplémentaire.)

(Supply similar information and signature for third and subsequent joint inventors.)